RECONSTRUCTION OF THE THUMB BY MICROVASCULAR TRANSFER OF THE GREAT TOE

A Case Report

by

A. G. LEONARD and J. COLVILLE
Northern Ireland Plastic and Maxillo-Facial Service

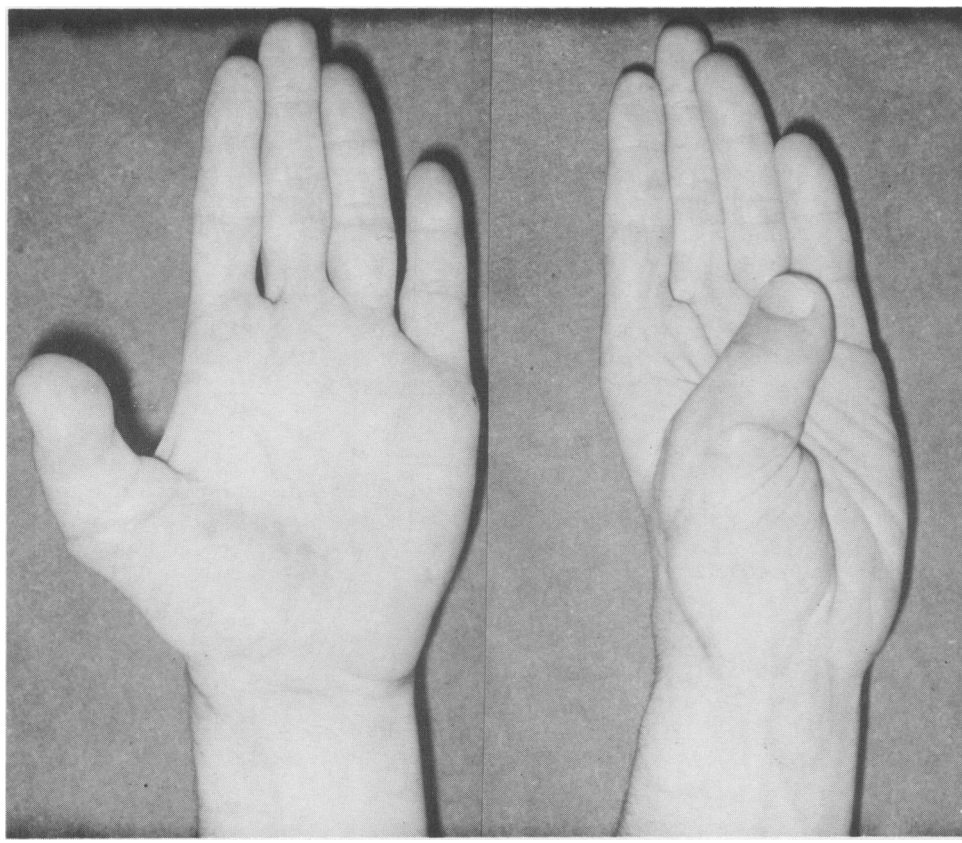
INTRODUCTION

TRAUMATIC amputation of the thumb is a particularly severe hand injury, because of the unique functional role of the thumb, and several methods exist for reconstruction of the thumb, all of which have disadvantages. Microvascular technique allows the transfer of a block of tissue from one site to another, by anastomosis of vessels with a known vascular territory to the vessels in the recipient area. Reconstruction of the thumb by microvascular transfer of the great toe was first described by Cobbett in 1969 and an improved technique was described by O'Brien in 1975. The purpose of this paper is to report the first such case carried out in Northern Ireland.

CASE REPORT

The patient, a 19 year old joiner, sustained a severe circular saw injury to his left hand on the 17th May, 1976. The thumb was amputated through the base of the proximal phalanx, and there were lacerations of the ulnar aspects of the index and middle fingers. In addition to the emergency surgery for suturing of the stump and lacerations, he had successful nerve grafts to the ulnar digital nerves in these fingers. At operation on the 3rd June, 1977, exploration of the thumb stump allowed identification of both digital nerves, the long flexor and extensor tendons, and the radial artery and cephalic vein. Exploration of the dorsum of the left foot allowed dissection of the first dorsal metatarsal branch of the dorsalis pedis artery, supplying the great toe, and the dorsal veins draining from the toe into the origin of the long saphenous vein. The flexor hallucis and extensor hallucis longus tendons and the digital nerves were isolated and divided, and the great toe resected at the metatarso-phalangeal joint, leaving it attached only by artery and vein, which were seen to provide an adequate circulation. The vessels were then divided and the hallux transferred to the hand, where it was implanted after trimming its proximal phalanx to the required length. Bone fixation was achieved by means of crossed Kirschner wires and one interosseous wire. The dorsalis pedis artery was anastomosed to the radial artery and the long saphenous vein to the cephalic vein, using 10/0 nylon suture and the operating microscope. Satisfactory circulation was restored, with an ischaemic time of under two hours. The extensor hallucis longus tendon was connected to the extensor pollicis longus, and the flexor hallucis to the flexor pollicis longus, and the digital nerves sutured. Finally, the skin was sutured, and the foot defect closed by means of a transposition flap and a skin graft. The procedure took a total of 12 hours and the transferred digit never gave any cause for concern. He was discharged on the 29th June, the delay being due to delayed healing of his foot,

and had further brief admissions for skin grafting to his foot, and for removal of the pins which were retained for two months after the transfer. After four months he had 40° of active flexion at the interphalangeal joint, and could flex and oppose to the base of the little finger. He returned to work at this stage. Reinnervation of the reconstructed thumb has progressed to provide sensation comparable with the other great toe, and the current range of movement is 60° at the interphalangeal joint. He admits to no significant disability in his foot.



This shows the reconstructed thumb in positions of abduction and opposition.

DISCUSSION

Several ingenious techniques exist for thumb reconstruction, all of which have disadvantages. The classical plastic surgical technique of an abdominal tube pedicle with a central bone graft, and sensory skin provided by transfer of a neurovascular island of skin from the ring finger, has the disadvantage of four or five operations and a total stay in hospital of at least eight weeks. It results in a 'digit' of abnormal appearance, with an island of sensory skin in the pulp area and is little more than a

rigid bony pillar covered by skin and subcutaneous tissue poorly adapted for its new role.

The more recent technique of pollicisation of the index finger where an appropriate length of index finger is transposed to the thumb stump, provides a reasonable alternative but at the expense of one finger and reduced hand width, and results in a 'thumb' of rather spindly appearance.

Microvascular transfer of the great toe allows the closest functional and cosmetic approach to the original digit, providing as it does a 'thumb' which has a stable sensory pulp, active flexion and extension, and a normal nail. The period of hospitalisation is short compared to the classical technique and the present expectation of 6 to 8 hours surgery for the whole procedure is considerably less than the cumulative operating time of the older staged reconstructions. In contrast to pollicisation, the rest of the hand is unscathed. The functional deficit in the foot is minimised by preservation of the head of the first metatarsal. In short, reconstruction of the thumb by microvascular transfer of the toe represents a major advance in reconstructive surgery of the hand.

SUMMARY

The patient, a 19 year old joiner, sustained a circular saw amputation of the left thumb. The reconstruction of a thumb by microvascular transfer of a toe is described, and the advantages of the technique discussed.

REFERENCES

COBBETT, J. R. (1969). Free digital transfer: report of a case of transfer of a great toe to replace an amputated thumb. *Journal of Bone & Joint Surgery,* **51B**, 677-9.

O'BRIEN, B. Mc., MacLEOD, A. M., SYKES, P. J. and DONAHOE, S. (1975). Hallux to hand transfer. *The Hand,* **7**, 128-33.